

What is claimed is:

1. An integrated information display and piezoelectric sound generating device comprising a thin-plate piezoelectric element serving as an oscillating source of a sound signal and a display device serving as part of a resonator.

2. The integrated information display and piezoelectric sound generating device in accordance with claim 1, wherein said thin-plate piezoelectric element is attached to a resonance box of said resonator.

3. The integrated information display and piezoelectric sound generating device in accordance with claim 2, wherein said display device is located on a top surface of said resonator.

4. The integrated information display and piezoelectric sound generating device in accordance with claim 1, wherein said thin-plate piezoelectric element is constituted by a plurality of piezoelectric oscillators.

5. The integrated information display and piezoelectric sound generating device in accordance with claim 1, wherein said thin-plate piezoelectric element is located in a lateral direction of said resonator and causes acoustic oscillation by repeating expansion and contraction in said lateral direction.

6. The integrated information display and piezoelectric sound generating device in accordance with claim 1, wherein said thin-plate piezoelectric element is connected to said thin flat display via an oscillation transfer pole.

7. The integrated information display and piezoelectric sound generating device in accordance with claim 1, wherein said display device is the one selected from the group consisting of a liquid crystal display, an organic electro-luminescent display, a reflection liquid crystal display, and a thin-film

display formed on a resin substrate.

8. An integrated information display and piezoelectric sound generating device comprising:

5 a resonance box;

a piezoelectric oscillator attached to a surface of said resonance box;

and

a thin flat display integrally formed with said resonance box.

10 9. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said thin flat display is integrally provided on a top surface of said resonance box.

15 10. The integrated information display and piezoelectric sound generating device in accordance with claim 9, wherein said piezoelectric oscillator is provided on an inner bottom surface of said resonance box.

20 11. The integrated information display and piezoelectric sound generating device in accordance with claim 9, wherein said piezoelectric oscillator is provided on an outer bottom surface of said resonance box.

25 12. The integrated information display and piezoelectric sound generating device in accordance with claim 9, wherein said piezoelectric oscillator is provided on each of inner and outer bottom surfaces of said resonance box.

30 13. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein a plurality of sound openings are provided adjacent to said thin flat display on the top surface of said resonance box.

14. The integrated information display and piezoelectric sound generating

device in accordance with claim 8, wherein said piezoelectric oscillator is connected to said thin flat display via an oscillation transfer pole.

5 15. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said piezoelectric oscillator has a thin-plate body extending parallel to said thin flat display.

10 16. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said thin flat display is a liquid crystal display.

15 17. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said thin flat display is an organic electro-luminescent display.

20 18. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said thin flat display is a reflection liquid crystal display.

25 19. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said thin flat display is a thin-film display formed on a resin substrate.

30 20. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said resonance box is made of a plurality of materials having different oscillatory characteristics.

21. The integrated information display and piezoelectric sound generating device in accordance with claim 20, wherein said resonance box is made of a first material except for the bottom on which said piezoelectric oscillator is provided, and the bottom of said resonance box is made of a second material.

22. The integrated information display and piezoelectric sound generating device in accordance with claim 21, wherein an elastic coefficient of said second material is larger than that of said first material.

5 23. The integrated information display and piezoelectric sound generating device in accordance with claim 22, wherein said second material is a polymeric material.

10 24. The integrated information display and piezoelectric sound generating device in accordance with claim 23, wherein an elastic coefficient of said first material is substantially identical with that of said thin flat display.

15 25. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said piezoelectric oscillator is connected to sound signal leads and said thin flat display is connected to display signal leads.

20 26. The integrated information display and piezoelectric sound generating device in accordance with claim 25, wherein said resonance box has a hole, and said sound signal leads and said information display signal leads extend out of said resonance box via said hole.

25 27. The integrated information display and piezoelectric sound generating device in accordance with claim 26, wherein said hole is provided on the bottom of said resonator box.

30 28. The integrated information display and piezoelectric sound generating device in accordance with claim 8, wherein said resonance box has electric terminals to which signal leads of said piezoelectric oscillator are connected by soldering or by means of connectors.

29. A mobile information terminal comprising:
a resonance box incorporated in a body of said mobile information terminal;
a piezoelectric oscillator provided on a bottom surface of said resonance box; and
a thin flat display formed on a top surface of said resonance box so that said thin flat display is located on a front face of said mobile information terminal.

30. The mobile information terminal in accordance with claim 29, wherein a plurality of sound openings are provided adjacent to said thin flat display on the front face of said mobile information terminal.

31. The mobile information terminal in accordance with claim 29, wherein a core camera and a microphone are provided on the front face of said mobile information terminal.

32. A wristwatch type mobile information terminal comprising:
a resonance box;
a piezoelectric oscillator provided on a bottom surface of said resonance box; and
a thin flat display formed on a top surface of said resonance box.

33. A digital versatile disk player comprising:
a resonance box;
a piezoelectric oscillator provided on a bottom surface of said resonance box; and
a thin flat display formed on a top surface of said resonance box.

34. A portable telephone comprising:
a resonance box incorporated in a body of said portable telephone;

a piezoelectric oscillator provided on a bottom surface of said resonance box;

a thin flat display formed on a top surface of said resonance box so that said thin flat display is located on a front face of said portable telephone; and

a plurality of sound openings provided in a peripheral region of said thin flat display located on the front face of said portable telephone.

35. A video camera comprising:

a resonance box incorporated in a body of said video camera;

a piezoelectric oscillator provided on a bottom surface of said resonance box;

a thin flat display formed on a top surface of said resonance box so that said thin flat display is located on a front face of said video camera; and

a plurality of sound openings provided in a peripheral region of said thin flat display located on the front face of said video camera.

36. The video camera in accordance with claim 35, wherein said resonance box is provided in a swingable lid of said video camera.

37. An apparatus for recording and reproducing video and acoustic information, said apparatus comprising:

a resonance box incorporated in a body of said recording and reproducing apparatus;

a piezoelectric oscillator provided on a bottom surface of said resonance box;

a thin flat display formed on a top surface of said resonance box so that said thin flat display is located on a front face of said recording and reproducing apparatus; and

a plurality of sound openings provided in a peripheral region of said thin flat display located on the front face of said recording and reproducing apparatus.